D EXTENDING CONCEPTS

1) $d_y = 1.80\text{m}$
$V_0 = ?$
$\bar{a} = -9.80\text{m/s}$
$V_f = 0$

$V_f^2 = V_0^2 + 2ad$

$0^2 = V_0^2 + 2(-9.8)(1.8\text{m})$

$\boxed{V_0 = 5.94\ \text{m/s}}$

2) a) $V_0 = 58.8\text{m/s}$
$a = -9.80\text{m/s}^2$
$t = 1.5\text{s}$
$V_{1.5s} = ?$

$V_f = V_0 + at$
$= 58.8 + (-9.8)(1.5)$

$\boxed{V_{1.5} = 44.1\ \text{m/s}}$

2b) d_y after 1.5 s = ?

$d_y = V_0t + \frac{1}{2}gt^2$
$= (58.8)(1.5) + \frac{1}{2}(-9.8)(1.5)^2$
$= 88.2 - 11.025$

$\boxed{d_y = 77.2\ \text{m}}$

2c) d_y after 9.0s

$d_y = V_0t + \frac{1}{2}gt^2$
$= (58.8)(9) - (4.9)(9)^2$

$\boxed{d_y = 132.3\ \text{m}}$

2d) V_f after 9.0s

$V_f = V_0 + at$
$= 58.8\text{m/s} + (-9.80\text{m/s}^2)(9.0)$

$\boxed{V_f = -29.4\ \text{m/s}}$

OR 29.4 m/s DOWNWARDS.

3) $V_{up} = 29.4 m/s$

$t = 20.0 s$

$d_{y\,balloon} = ?$

$d_y = V_o t + \frac{1}{2} g t^2$

$= (29.4)(20.0s) - (4.9)(20.0s)^2$

$= 1372 m$ high.

4) $V_s = 330 m/s$ (const)

$t_b = 5.0 s$

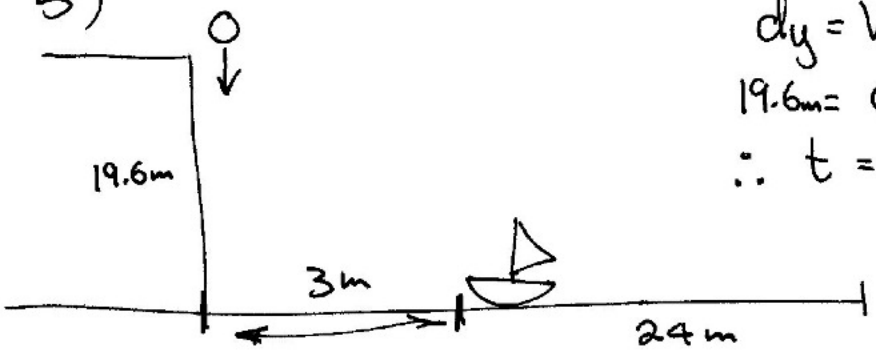
$V_b = 500 m/s$

$d = V_s \times t_s$

$= 330 m/s \times 5.0 s$

$\boxed{d = 1650 m}$

5)



$d_y = V_{oy} t + \frac{1}{2} g t^2$

$19.6m = 0 + 4.9 t^2$

$\therefore t = 2.0 s$

$\therefore$ the boat must travel 24m in 2.0s

$\therefore$ it has a $\boxed{v = 12.0 m/s}$